

TESTIMONY FOR THE
U.S. SENATE COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION

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My name is Brian J. Rothschild. I am the Dean of the Graduate School of Marine Sciences and Technology, University of Massachusetts System and the Director of the Center for Marine Science and Technology, University of Massachusetts Dartmouth. I have been working in fisheries for 47 years. I have been involved in fishery research and management of most of the major fisheries in the U.S.

I am pleased to provide you with recommendations to change the Magnuson-Stevens Act, including cooperative research and science issues.

Any recommendations for changing the Magnuson-Stevens Act depends on a) whether or not the Nation is realizing the full potential of its fishery resources, and b) and the extent to which any shortfalls in performance results from the language of the act itself, its interpretation via guidelines, or its implementation by DOC.

It seems fair to say that the Act is not perceived as its achieving its intended goal.

Addressing the perceptions involves a wide range of issues, many of which are complex. However, a key issue involves science and cooperative research. My theme is that

***The central technical concept in the Act, "overfishing" is difficult to define in a non-arbitrary way. It is difficult to use as a practical criterion. It should be replaced by a criterion that is simpler and more practical. The levels of optimal fishing should be set by optimization techniques widely used by many industries. Multiple species catch levels and bycatch should be optimized, and reasonable thresholds on minimum stock abundance should be maintained.

***The concept of rebuilding is logically difficult to define and also open to arbitrary interpretation. More easily defined and practical targets should replace it. Maintaining optimal levels of catch (i.e., fishing mortality) suppresses the need for rebuilding stocks.

***Not all declines in fish stocks are the result of fishing. Declines in fish stocks are sometimes caused by environmental changes in the ocean. Significant societal costs occur when declines in fish stocks that result from the environment are attributed to fishing.

***Innovations in management approaches are necessary to develop non-arbitrary and participatory management measures. It is not to the fishermen's advantage to keep stocks at minimal levels.

***It is evident that the necessary innovations in fishery management can only arise through considerably intensified data collection on fish-population-abundance obtained directly from the fishing fleet. It is only through very detailed analysis of day-to-day fishing records that stock abundances can be regularly monitored and the power of the fishery to remove fish is determined.

***It is only through the simultaneous monitoring of fish abundance and the environment that the effects of fishing can be separated with the effects of the environment. Not keeping track on a daily or weekly basis of stock abundance and the environment is analogous to a department store owner who checks sales and inventory only once a year or once every two years and ignores consumer preferences.

***In order to implement these research changes, it will be necessary to rely to a much greater degree on

observations made directly by fishermen. In fact, such a program is required if we are going to collect the data that are needed to develop a monitoring system that has the confidence of all interested parties in fishery management. In addition, involving to a greater degree fishermen in the process increases the legitimacy of the data and entire process.

To highlight these points, consider the definition of biological overfishing in the technical literature. In this literature there are three different definitions of overfishing: production overfishing, stock overfishing, and recruitment overfishing. The definitions are different. They are reasonable theoretical concepts, but they are generally not supported by actual data—that is to say there is considerable variability between the actual data and theoretical predictions. Furthermore, the technical theories upon which definitions of overfishing are built are really single-species theories. This means that a non-overfishing definition for one species may necessitate overfishing another species.

It is interesting to observe as well that only one of these theories—within reasonable bounds—has a general conservation impact. This is the recruitment overfishing theory. But this is the aspect of overfishing that is least known and the most difficult to understand. The theory of recruitment is by far the least understood aspect of fisheries science and still the subject of intense research around the world.

All of this leads, of course, to the fact that if we are unclear as to the precise definition and application of overfishing then its use creates the perception of faulty management. (In fact, in some cases because it is not known whether or not a stock is overfished, proxies are developed in the guidelines to determine whether a stock is overfished.) An analysis by FAO of all fish stocks under its jurisdiction as to whether they were overfished or not led to considerable controversy because the definitions were not clear. All of this leads, of course, to the fact that if we are unclear about our definition of overfishing, then how can we be clear about rebuilding stocks or even imputing that stocks may be overfished in the near future.

So, it should be clear that whether or not a stock is declared to be overfished is not a clearly honed concept. It is, in general, more or less an art that is subject to a tremendous scope of interpretation. Because there is such a wide scope of interpretation, the issues become contentious and this leads to the perception that stocks are not managed in the best possible way. It really places scientists in the unfortunate and counterproductive position of declaring whether or not a stock is overfished while it is really the councils and the managers who need to and are better prepared to make these decisions.

Absent of guidelines developed by SOC on theoretical concepts that are shaky when put into practice, how would we know whether or not a stock is overfished—how would we know how to rebuild a stock—how would we know whether or not to take draconian measures limiting catch and; how would we know how to fine-tune effort limitations regarding plus or minus a small number of days that would have a big impact; how would we know that in fact we were addressing the right problem? In other words, a decline in stock abundance could as easily relate not to fishing or overfishing but to degradation of the nursery habitat, or to natural changes. In fact, a decline in a stock might very well be the consequence of a management regulation that protects one species at the expense of another. The relation of dogfish and groundfish in New England and the mid-Atlantic are good examples. So is the relation between herring/mackerel and groundfish.

All of this may sound like “because we don’t know, let’s do nothing.” It may also sound like “fishing has minimal or no effects on the stock.” Neither of these assertions is intended. Rather, we hope to move away from over-simplified criteria and take into account, much more intensively, data from actual fishing operations.

As suggested above, it is possible to conceive of a new approach to management where we would minimize an emphasis on whether or not a stock is overfished or not especially since the definitions are difficult and attempt to maintain a stock at some level that is reasonable for the industry and does not drop below some flexible floor. We also need to experiment with various combinations of effort and mixes of species. We need to view management in a much more flexible context. We should, in fact, use an adaptive management

approach where we try an approach and watch whether the approach is working and then make iterative corrections as necessary.

How would such an approach be implemented? It is necessary to begin to think that we need a much more intensive virtually real-time monitoring of the stocks and the catch and the ocean environment. We have to rely to a much greater extent on the fishing fleet to provide data on the status of the stocks and the condition of the ocean environment.

This is where we need to revise our ideas on implementation. We need to rely to a much greater degree on cooperative research and sampling of the catch. This implies that for most fishing trips the fishermen would be responsible for filling out detailed logs that indicate the abundance of fish and the condition of the ocean environment; that the catches would be sampled at dockside and the logs collected; that the research establishment would place the highest priority on the analysis and quick turn around of information; and that the management team would warn if the stock exceeded bounds.

To some extent, these ideas may seem almost heretical, however, they are bound to meet with success. Not only will they provide better information, both the fishing and conservation groups will be more agreeable with the information because they will have participated in the process.

We are already working on involving fishermen in data collection. The Massachusetts Fisheries Recovery Commission, instituted through the legislative efforts of Senators Mark Montigny and Bruce Tarr, has developed a plan involving high-resolution surveys, comparisons of fishing boat efficiency with research boat efficiency, and stock identification. Possible sentinel fisheries is being implemented by the Massachusetts Division of Fish and Game and the University of Massachusetts Graduate School of Marine Sciences and Technology (CMAST), and we have begun to issue prototype forecasts of the ocean environment through NASA funding. Funding for the fishermen to cooperate on this program has been facilitated by Senator Kerry.

Another example of cooperative management that has produced spectacular results is that we worked together with the scallop industry in New Bedford, NMFS, and VIMS, with some support from NASA, to survey the scallop areas in the closed portion of Georges Bank. Our work and the help of Senator Kennedy and Congressman Frank resulted in \$35 million ex-vessel in scallops last year and probably \$70 million this year!

To sum up, in my view it is time to retool the Magnuson-Stevens Act to put in perspective the issue of overfishing. We have to realize that the definition of overfishing is really very soft. Rather, we should develop alternative management criteria of keeping the stock above some flexible threshold level. Cooperative research would, in fact, be necessary to maintain the appropriate data stream. At the end of the day, this would be much more cost effective than the present method, particularly with fuller use of computers and the information super highway. We need to put in place a task force to work out the details of the innovations. This task force should draw upon the expertise of NMFS and academia.